This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

Claims 1-8 (Previously cancelled).

Claim 9. (Currently amended) ~~In a~~ A process for producing unsaturated aldehyde and unsaturated acid ~~by the vapor phase oxidative dehydrogenation of~~ from C_2 to C_5 alkene ~~in the presence of molecular oxygen, the improvement comprising, carrying out the~~ obtained by vapor phase oxidative dehydrogenation of C_2 to C_5 alkane in the presence of molecular oxygen and an oxidative dehydrogenation catalyst comprising a multimetal mixed oxide having the formula

$$Mn_\alpha E^1_\beta E^2_\gamma O_x \qquad (1)$$

where Mn denotes manganese;

O denotes oxygen;

E^1 represents one or more metal elements selected from the group consisting of phosphorus, arsenic, antimony, boron, sulfur, selenium, tellurium, fluorine, chlorine, bromine, iodine, niobium, tantalum, tungsten, rhenium and copper;

E^2 represents one or more metal elements selected from the group consisting of chromium, iron, cobalt, nickel, silver, gold, zinc, thallium, tin, lead, bismuth, lithium, sodium, potassium, rubidium, cesium, magnesium, calcium, strontium, barium, yttrium, lanthanum, cerium, neodymium, and samarium; and,

α, β, γ and x denote atomic numbers of Mn, E^1, E^2, and oxygen, respectively, and,

when α=1, β=0.01-10, γ=0-5, and x has a numerical value determined by the state of oxidation of the elements other than oxygen,

comprising subjecting the C_2 to C_5 alkene to vapor phase oxidation in the presence of molecular oxygen and a molybdenum-containing, multimetal, mixed oxide catalyst to produce unsaturated aldehyde and unsaturated acid.

Claim 10. (Original) The process according to claim 9, wherein, in the oxidative dehydrogenation catalyst of formula (1), when α=1, β=0.02-2 and γ=0-1.

Claim 11. (Original) The process according to claim 10, wherein E^1 comprises at least sulfur, and the sulfur is added in the form of its sulfate ion (SO_4^{2-}).

Claim 12. (Original) The process according to claim 9, wherein E^1 comprises at least sulfur, and the sulfur is added in the form of its sulfate ion (SO_4^{2-}).

Claim 13. (Original) The process according to claim 9, wherein the oxidative dehydrogenation catalyst of formula (1) is one which is dried and fired at temperatures not higher than 300° C.

Claim 14. (Original) The process according to claim 9, wherein the oxidative dehydrogenation catalyst is supported on a refractory inorganic carrier.

Claim 15. (Currently amended) The process according to claim 9, wherein the oxidative dehydrogenation of said ~~alkene~~ alkane is

carried out at a space velocity of from 300 to 30,000 hr^{-1}, and at a temperature of from 250 to 650° C.

Claim 16. (Cancelled).

Claim 17. (Cancelled).

Claim 18. (Cancelled).

Claim 19. (Cancelled).

Claim 20. (Cancelled).

Claim 21. (Cancelled).

Claim 22. (New) The process of claim 9 comprising subjecting the C_2 to C_5 alkene to vapor phase oxidation in the presence of molecular oxygen and a molybdenum-containing, multimetal, mixed oxide catalyst of the following formula (2):

$$Mo_aBi_bFe_cA_dB_eC_fD_gO_x \qquad (2),$$

wherein Mo denotes molybdenum,

Bi denotes bismuth,

Fe denotes iron,

O denotes oxygen,

A represents at least one metal element selected from the group consisting of cobalt and nickel,

B represents at least one metal element selected from the group consisting of alkali metals and thallium,

C represents at least one metal element selected from the group consisting of silicon, aluminum, zirconium and titanium,

D represents at least one metal element selected from the group consisting of tungsten, phosphorus, tellurium, antimony, tin, cerium, lead, niobium, manganese, arsenic and zinc,

a, b, c, d, e, f, g, and x represent the atomic ratios of the respective elements, and,

when a=12, b=0.1-10, c=0.1-20, d=2-20, e=0.0001=10, f=0-30, g=0-4, and x is a numerical value determined by the state of oxidation of the elements other than oxygen.

Claim 23. (New) The process of claim 22 further comprising subjecting the unsaturated aldehyde obtained therein to vapor phase oxidation in the presence of molecular oxygen and a further molybdenum-containing, multimetal, mixed oxide catalyst to produce unsaturated acid.

Claim 24. (New) The process of claim 23 wherein the further molybdenum-containing, multimetal, mixed oxide catalyst is a catalyst of the following formula (3):

$$Mo_nV_iW_jE_kF_lG_mH_nO_x \qquad (3)$$

where Mo denotes molybdenum,

V denotes vanadium,

W denotes tungsten,

O denotes oxygen,

E represents at least one element selected from the group consisting of copper, cobalt, bismuth and iron,

F represents at least one element selected from the group consisting of antimony and niobium,

G represents at least one element selected from the group consisting of silicon, aluminum, zirconium, and titanium,

H represents at least one element selected from the group consisting of alkaline earth metals, thallium, phosphorus, tellurium, tin, cerium, lead, manganese and zinc;

h, i, j, k, l, m, n, and x represent the atomic ratios of the respective elements, and, when h=12, i=0.1-10, j=0-10, k=0.1-20, l=0-10, m=0-10, n =0-30, and x has a numerical value determined by the state of oxidation of the elements other than oxygen.

Claim 25. (New) The process of claim 9 further comprising subjecting the unsaturated aldehyde obtained therein to vapor phase oxidation in the presence of molecular oxygen and a further molybdenum-containing, multimetal, mixed oxide catalyst to produce unsaturated acid.

Claim 26. (New) The process of claim 25 wherein the further molybdenum-containing, multimetal, mixed oxide catalyst is a catalyst of the following formula (3):

$$Mo_nV_iW_jE_kF_lG_mH_nO_x \qquad (3)$$

where Mo denotes molybdenum,

V denotes vanadium,

W denotes tungsten,

O denotes oxygen,

E represents at least one element selected from the group consisting of copper, cobalt, bismuth and iron,

F represents at least one element selected from the group consisting of antimony and niobium,

G represents at least one element selected from the group consisting of silicon, aluminum, zirconium, and titanium,

H represents at least one element selected from the group consisting of alkaline earth metals, thallium, phosphorus, tellurium, tin, cerium, lead, manganese and zinc;

h, i, j, k, l, m, n, and x represent the atomic ratios of the respective elements, and, when h=12, i=0.1-10, j=0-10, k=0.1-20, l=0-10, m=0-10, n =0-30, and x has a numerical value determined by the state of oxidation of the elements other than oxygen.

Claim 27. (New) A process for producing unsaturated aldehyde and unsaturated acid comprising the steps of:

subjecting C_2 to C_5 alkane to vapor phase oxidative dehydrogenation in the presence of molecular oxygen and an oxidative dehydrogenation catalyst comprising a first multimetal, mixed oxide catalyst having the formula (1):

$$Mn_{\alpha}E^{1}_{\beta}E^{2}_{\gamma}O_{x} \qquad (1)$$

where Mn denotes manganese;

O denotes oxygen;

E^1 represents one or more metal elements selected from the group consisting of phosphorus, arsenic, antimony, boron, sulfur, selenium, tellurium, fluorine, chlorine, bromine, iodine, niobium, tantalum, tungsten, rhenium and copper;

E^2 represents one or more metal elements selected from the group consisting of chromium, iron, cobalt, nickel, silver, gold, zinc, thallium, tin, lead, bismuth, lithium, sodium, potassium,

rubidium, cesium, magnesium, calcium, strontium, barium, yttrium, lanthanum, cerium, neodymium, and samarium; and,

α, β, γ and x denote atomic numbers of Mn, E^1, E^2, and oxygen, respectively, and,

when α=1, β=0.01-10, γ=0-5, and x has a numerical value determined by the state of oxidation of the elements other than oxygen,

to obtain C_2 to C_5 alkene;

further oxidizing the obtained C_2 to C_5 alkene in the presence of molecular oxygen and a second multimetal, mixed oxide catalyst having the formula (2):

$$Mo_aBi_bFe_cA_dB_eC_fD_gO_x \qquad (2),$$

wherein Mo denotes molybdenum,

Bi denotes bismuth,

Fe denotes iron,

O denotes oxygen,

A represents at least one metal element selected from the group consisting of cobalt and nickel,

B represents at least one metal element selected from the group consisting of alkali metals and thallium,

C represents at least one metal element selected from the group consisting of silicon, aluminum, zirconium and titanium,

D represents at least one metal element selected from the group consisting of tungsten, phosphorus, tellurium, antimony, tin, cerium, lead, niobium, manganese, arsenic and zinc,

a, b, c, d, e, f, g, and x represent the atomic ratios of the respective elements, and,

when a=12, b=0.1-10, c=0.1-20, d=2-20, e=0.0001=10, f=0-30, g=0-4, and x is a numerical value determined by the state of oxidation of the elements other than oxygen,

to obtain unsaturated aldehyde and unsaturated acid; and

further oxidizing the obtained unsaturated aldehyde in the presence of molecular oxygen and a third multimetal, mixed oxide catalyst having the formula (3):

$$Mo_nV_iW_jE_kF_lG_mH_nO_x \qquad (3)$$

where Mo denotes molybdenum,

V denotes vanadium,

W denotes tungsten,

O denotes oxygen,

E represents at least one element selected from the group consisting of copper, cobalt, bismuth and iron,

F represents at least one element selected from the group consisting of antimony and niobium,

G represents at least one element selected from the group consisting of silicon, aluminum, zirconium, and titanium,

H represents at least one element selected from the group consisting of alkaline earth metals, thallium, phosphorus, tellurium, tin, cerium, lead, manganese and zinc;

h, i, j, k, l, m, n, and x represent the atomic ratios of the respective elements, and, when h=12, i=0.1-10, j=0-10, k=0.1-20, l=0-10, m=0-10, n =0-30, and x has a numerical value

determined by the state of oxidation of the elements other than oxygen,

to obtain unsaturated acid.